

## PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

## Improvements in or relating to Flow Diversion Controls

We, THE A.P.V. COMPANY LIMITED, of Manor Royal, Crawley, Sussex, a British Company, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to flow diversion controls.

10 In continuous heat treatment plant, such as that used in the pasteurization or ultra high temperature treatment of milk, beer, fruit  
15 juices and other potable liquids, it is usual to provide a diversion valve at the outlet of the final heating section. The purpose of this valve is to divert the product which is below heat treatment temperature away from the cooling sections on the finished product side of the plant. This is necessary to ensure  
20 that untreated product neither leaves the plant nor enters the finished product side where it could contaminate this section, which is rendered sterile before the process is started.

25 On some plants, notably ultra high temperature milk sterilisation plant, the flow diversion valve operates under pressure when the flow is diverted. In this condition there must be no risk of leakage through the valve into the finished product cooling sections. The  
30 general method of safeguard which is provided takes the form of a double seated valve which closes both the outlet port from the valve and the inlet connection to the finished product sections and provides between  
35 the two seats a leakage space connecting with the atmosphere.

40 Whilst this method provides a positive safeguard, it is not only satisfactory in that it cannot be conveniently cleaned in place by circulating cleaning solutions through it. This arises because product invariably enters the

leakage space and it is then difficult to reach with the cleaning solutions.

In order to overcome this difficulty, a flow diversion control according to the invention 45 comprises a valve adapted to open or close a product diversion line, a pair of valves in series in the product output line and adapted to close or open simultaneously with the opening or closing of the valve in the diversion 50 line, and means for pressurising the part of the output line between the said pair of valves when they are closed.

If the said part of the output line is pressurised to a pressure greater than the 55 pressure of the product as it passes into the diversion line when any leakage past the first of the pair of valves must be in a direction out of the output line towards the diversion line so that there is no danger of contaminat- 60 ing the finished product side of the plant.

The invention will be further described with reference to the drawing accompanying provisional specification which is a diagram- 65 matic representation of a preferred form of flow diversion control according to the invention.

Referring to the drawing, it will be seen that raw or partially processed product, e.g. 70 milk, is fed in *via* line 1 to one side 2 of a regenerating heat exchanger where it is in indirect heat exchange with processed product in the other side 3, which forms part of the product output line 4. The product passes from the side 2 to a treatment heat 75 exchanger 5 where it is in indirect heat exchange relationship with steam, or other heating medium from a line 6. From the exchanger 5 the product reaches a flow diversion control arrangement of valves which pass 80 it either to the output line 4 or to a diversion line 7 depending on the temperature of the product leaving the heat exchanger.

[Price 4s. 6d.]

The arrangement preferably comprises 'Zephyr' automatically and remotely controlled air operated valves controlled by a thermostat (not shown) exposed to the product between the heat exchanger 5 and the arrangement of valves. The arrangement comprises a valve 8, controlling the diversion line 7 and normally closed when product temperature is high enough, and valves 9 and 10 in series controlling the product output line and normally open when the product temperature is high enough. When the temperature of the product falls below the prescribed level the valve 8 is opened and the valves 9 and 10 are closed. Simultaneously a pressurising means 11 is operated to pressurise the section 12 of the line 4 between the valves 9 and 10 to prevent leakage of product past the valve 9 into the line 4.

The section 12 between valves 9 and 10 could be pressurised by means of steam or compressed air applied directly. Alternatively a piston, plunger, bellows or diaphragm could be used, which would be loaded by a spring, compressed air or any other suitable medium. When using a plunger or similar device, it is also possible to detect leakage by the movement of the device, and this can then be used to operate a switch which in turn could operate a warning device.

This system has no passage communicating with atmosphere and is therefore easily cleaned in place.

The output line 4 also includes a cooling section 13.

Various modifications may be made within the scope of the invention. Thus while the arrangement has been particularly described in

relation to a U.H.T. milk treatment plant it could readily be applied to any of a wide range of process plants requiring a flow diversion valve. 40

#### WHAT WE CLAIM IS:—

1. A flow diversion control comprising a valve adapted to open or close a product diversion line, a pair of valves in series in the product output line and adapted to close or open simultaneously with the opening or closing of the valve in the diversion line, and means for pressurising the part of the output line between the said pair of valves when they are closed. 45
2. A flow diversion control as claimed in claim 1, wherein each of the valves is a remotely controlled air operated valve. 55
3. A flow diversion control as claimed in claim 1 or 2, wherein the pressurising means is a source of compressed air or steam which is applied directly to the said part of the output line. 60
4. A flow diversion control as claimed in claim 1 or 2, wherein the pressurising means comprises a movable element, such as a piston, plunger, bellows or diaphragm, acting on the said part of the output line and loaded by external means such as compressed air or a spring. 65
5. A flow diversion control substantially as hereinbefore described with reference to the drawing accompanying the provisional specification. 70

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1055502  
1 SHEET

PROVISIONAL SPECIFICATION  
This drawing is a reproduction of  
the Original on a reduced scale

